

QUARTERLY REPORT

CARNEGIE
CORPORATION
OF NEW YORK

January, 1955

Education of an Engineer

SOME of the major decisions determining the shape of American higher education are not made by faculties and administrators. They are made by students.

For decades we have been witnessing a massive movement of student enrollments away from the traditional liberal arts subjects and toward occupational, technical and professional courses. As a result, the liberal arts college is ringed around by vigorous competitors — business schools, engineering schools, teachers colleges, schools of journalism, and so forth. Those who believe in the enduring value of a liberal education have worked to strengthen and enrich the curriculum of the liberal arts college. Such efforts are of great value. But they do not reach the hundreds of thousands of students who attend other colleges. It is necessary that the ideals of a liberal education be carried to every institution of higher education, no matter how special

or technical its character may be.

The problem of providing every student with a broad liberal education reaches its most acute form in the advanced scientific and technical schools. The demands of modern science and technology are such that students must be given the most intensive exposure to technical subjects. To find time for such courses as history, literature, government and economics is most difficult. Yet, as technology today plays an ever-larger role in our lives, the engineer, the scientist and the technician are certain to come into positions of greater and greater responsibility. It is all the more imperative that they should have a broad and deep understanding of human values and human behavior in order to carry out properly the responsibilities of leadership.

The technical schools of the country have been well aware of this problem in recent years, and a





number of them have developed programs designed to broaden and enrich their non-technical course offerings. Carnegie Corporation is currently providing a measure of support to such programs at four of the nation's leading technical institutions—the California Institute of Technology, the Carnegie Institute of Technology, the Case Institute of Technology and the Massachusetts Institute of Technology.

Elliott Dunlap Smith, Provost of Carnegie Institute of Technology, gives an interesting report on the background and theory of work being done there. "Some eighteen years ago," he recalls, "Carnegie Institute of Technology undertook to develop a program of professional education in engineering sciences which would so educate students that they would grow throughout their lives in professional and personal stature and in usefulness as citizens. As part of this development, Carnegie concurrently introduced a program of courses in the humanistic and social fields occupying about one-fourth of the undergraduate curriculum.

"It became increasingly clear that to add courses in the humanities to the engineering curriculum was not enough to accomplish its purposes. To make the humanities and social sciences courses interesting and meaningful was also not enough. The courses still remained a thing apart—a decorative mistletoe and not a vital part of the student's tree of professional

power. What was essential was that these courses should be so taught that, while gaining deep understanding of humane and social values, the student learns from practice how to deal with human, social and professional problems by using a common, orderly, and self-reliant method of thought."

Stressing the importance of this principle by referring to "the character of leadership which our free society demands," Mr. Smith points out that "if the general course of study promotes habits of listening to authority, accepting it uncritically and then storing it in memory as a basis for further judgments, the student will carry these habits out into his life as a citizen. There is no escape. As the education of a student so taught proceeds, it becomes harder for him to face the responsibility of reaching important conclusions for himself on complex problems. He neither knows how to go about it nor has the self-reliance to do it with perseverance and conviction. Consequently, all courses, not merely those in the humanities and social sciences, must be taught by methods that develop self-reliant learning and problem-solving."

The program at the Case Institute of Technology in Cleveland has been developed by Robert L. Shurter, Director of the Division of Humanities and Social Studies, who lays emphasis on these goals:

To prepare the engineer to express his ideas clearly and concisely in both speaking and writing.

To give him an understanding of and convictions about his responsibilities as a citizen.

To provide him with a knowledge of the background of the social organization within which he lives and of the great expressions of the human mind concerning man and society.

To stimulate his interest in some aspect of the humanities or social studies as a basis for continued study or pleasure in these pursuits.

He points out that the accomplishment of these objectives in a technical school requires the best and most imaginative teaching. Although engineering students may—and in the best schools do—rate very high in intelligence, their background in English, history and the social studies may be weak. Because they are youngsters with a strong interest in technical matters, they may find these subjects boring.

Fortunately, Mr. Shurter notes, the best technical schools can attract teachers of the caliber needed. "On the crassly commercial but very important matter of salaries, most good engineering schools are in an advantageous position. To attract good scientific and engineering faculty, they must maintain a high salary scale if they are to compete with business and industry." He believes a uniform salary scale for scientific and humanities faculties is an "absolute must."

In Pasadena, Hallett D. Smith, Chairman of the Division of the Humanities at California Institute of Technology, is favorably impressed with the lack of elaborate departmentalization which has plagued other institutions. He has tried to recruit faculty with training in more than one field, and to develop basic courses which cut across conventional fields.

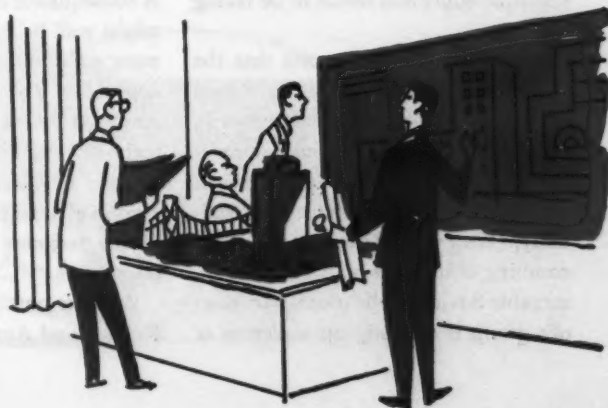
California Institute is as liberal as any, and more liberal than most, technical schools in its allotment of time—25 per cent—to courses in the humanities and social sciences. But even so, the time available is extremely short for accomplishing the varied objectives involved in acquainting a student with his own society, his heritage and the world around him. Mr. Smith has explored with interest and with considerable success the potentialities of non-classroom time as a source of educational experience. Among other things, he has encouraged the founding of a literary magazine, has supported chamber music concerts, has sponsored art exhibits and has instituted a Public Affairs Room where students can browse through current periodicals and books. Students take to these extra-curricular opportunities with enthusiasm.

Other approaches to the proper presentation of humanistic studies are being tried at Massachusetts Institute of Technology. MIT has grouped its studies in a School of Humanities and Social Sciences which bears a high reputation for its work in economics, industrial relations, international studies and other fields. Dean of this school is John E. Burchard.

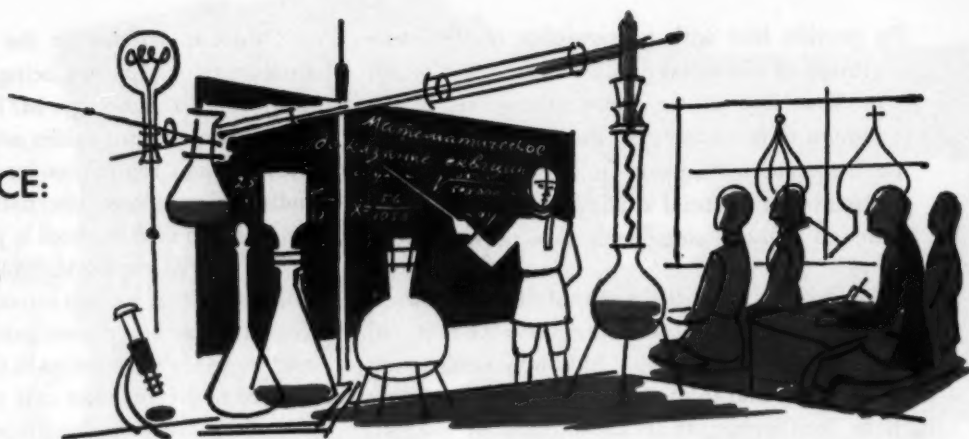
Mr. Burchard reports, "A fundamental principle of our plan is that we first introduce the student for two years to some of the great points of our historical past and try to see these points in the round, as products of science and economics and philosophy and art and morality. We examine these fields through many different kinds of eyes: the eyes of an economist or a poet, a philosopher or a political theorist. All the discussions that go on, and they are countless, relate these past matters to our present life."

The second underlying principle of the MIT plan, Mr. Burchard states, is that the student benefits from a little "deep digging" in a field other than his specialty. "He learns respect for another area of thought which cannot be obtained by examining it superficially, and sees that there are many roads to wisdom. To accomplish this, we require him to elect a sequence of subjects in one area of the social sciences or humanities in his upperclass years. Literature, psychology, economics and music are the most popular."

Although each of the institutions mentioned has taken a wholly different approach to the problem of exposing technical students to the humanities and social sciences, all have essentially similar goals. All are concerned with insuring that the highly selected young men who gain admission to our technical schools shall not be cut off from the full richness of their own cultural heritage or deprived of the broad and deep education which our society demands of its ablest men.



SOVIET SCIENCE: UNFATHOMED THREAT



The Soviet Union may soon be turning out more than twice as many scientists and engineers as the United States. In the context of the cold war, this seems an alarming development.

Before we can assess its meaning, however, we need accurate knowledge of the nature and quality of Soviet scientific and engineering education. We are beginning to get such information. As a first step, a pilot study was made last year at the Center for International Studies of Massachusetts Institute of Technology under the direction of Alex Korol. The work will be continued this year with the aid of a \$20,000 grant from the Corporation.

According to members of the project's staff, the best available evidence suggests that the quality of Russian technical education is anything but poor. We deplore the lack of democratic freedom for Russian students but, judging strictly on technical grounds, one must conclude that high-quality scientific education seems to be taking place.

The staff at MIT reports that the scarcity of data available on Russia makes an evaluation of differences in the quality of scientific and engineering education in American and Soviet institutions extremely difficult. Gradually, however, through a careful combing of statistics scattered in innumerable Soviet publications, Mr. Korol's group is building up a picture of

what the system looks like and how it operates. Key materials are translated from Russian into English, and the staff uses the informed judgment of MIT faculty members in evaluating curricula and textbooks for specific courses.

Interesting comparisons between Russian and American methods of technical education have already begun to emerge. An outstanding characteristic of Russian engineering education is its high degree of specialization. This is illustrated by the titles of actual courses that students specialize in: "The Mechanical Equipment of Cement Industries," "The Technology of the Macaroni Business," and "The Uses of Machinery and Electricity in Animal Husbandry." By way of contrast, in the United States some engineering departments have abandoned elective courses in specialty subjects and require more general and theoretical engineering courses in their place. A consequence of this marked contrast might well be that our engineers have more self-confidence in their ability to cope with a wide range of problems and a greater capacity to keep up with technological change. A highly specialized engineering education might tend to give graduates a vested interest in the technics that they have been taught.

Another notable difference between Russian and American scientific man-

power is their small supply of second-line technicians. Although top-grade Russian graduates are fitted to design machinery and equipment, there is a shortage of men capable of operating, maintaining and repairing it. This suggests that Russia's apparent lead in turning out engineers from her formal education system may have some counterbalancing factors: it is entirely possible that she may have a lead she is unable to exploit because of her lack of skilled operators.

There is recent evidence that top Soviet officials are making the same criticisms of their educational system that we might make. They are currently engaged in a large-scale effort to achieve a better balance in their technical personnel by expanding their vocational high schools, apparently in the hope of training more second-line technicians. And the editorial column of *Pravda* for September 23, 1954, commented, "The extensive narrowness of specialization will have to be eliminated in the immediate future . . . the training of specialists of a much broader profile must be organized. . . ." How much difficulty the Soviet Ministry of Higher Education will have in carrying through reforms remains to be seen.

Mr. Korol's group hopes to complete the study by the end of 1955, and they plan to publish their findings soon after.

WEST INDIAN AWAKENING

Seven years ago, near the foothills of the Blue Mountains of Jamaica, rich ground was broken with plow, pick and bulldozer. British and West Indian skills were put to work on construction and design. Native limestone, gypsum and concrete went into the buildings which rose starkly white and modern against the green tropical foliage. They were to house one of the newest colleges in the world—the University College of the West Indies.

Students came from all parts of the British Caribbean, from Barbados, Trinidad, British Guiana, British Honduras, Grenada, the Leeward and Windward Islands, the color in their faces ranging from deep brown through tan to white, their accents varying from the clipped British of Barbados to the soft Creole patois of St. Lucia, their academic gowns a brilliant scarlet after the fashion of St. Andrew's in Scotland.

These students, and their counterparts in far-flung British colonies, are participants in one of the most dynamic educational ventures in history, a broad venture carried forward in Nigeria, East Africa, Rhodesia, the Gold Coast and elsewhere. After the war, Great Britain put into effect a long-range plan for the development of higher education in the colonies. She made capital grants for several new institutions for education and

research in the colonial areas with the understanding that the colonies themselves would provide continuing support. This was a response to the need for vigorous local colleges equipped to teach and train the men and women to whom the colonies, moving toward self-government, will soon look for leadership.

These young colonial colleges face predictable difficulties. The problems of the West Indies are in many ways typical. Beyond the question of academic standards—which must match those of English institutions—the University faces the necessity of relating itself realistically to the society which it serves. The education it offers must enable students to understand and cope with the problems of their part of the world. British and colonial educators believe that the “regionalizing” of colonial education will result in great vitality in the new institutions; indeed, they believe that this may be the main way these colleges can make a distinctive contribution to world scholarship.

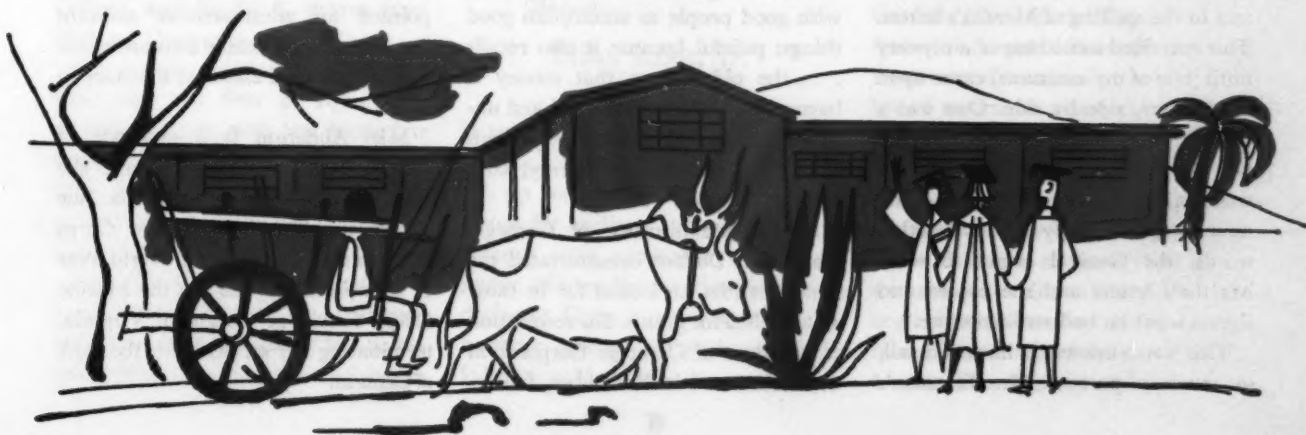
A recent Carnegie Corporation grant of \$64,000 to the University College of the West Indies was designed to aid the University in the task of serving its own region more effectively. Part of the grant will provide for travel to familiarize the staff with people and problems in the seven territories which support the college. Few faculty mem-

bers have any extensive familiarity with the vast region which they serve, an area spread out over 2,000 miles. Another part of the grant will be used to stimulate research on local subjects.

The colonial colleges have “laboratories” for regional research literally at their doorsteps. The tropical areas of the world have been relatively unexplored by scholars. A comprehensive history of the Caribbean, for example, has not been attempted since 1794! Under the Corporation grant, local scholars will undertake this much-needed job.

How the University College can help to solve the pressing problem of training public administrators will also be examined. The College has scheduled a conference on this subject, in which representatives from local governments and experts from abroad will participate. A survey of the complex linguistic patterns of the Caribbean is also planned. When completed, it will show what actually happens when languages and cultures from Europe, Africa and Asia are transplanted and mingle with each other.

The state of higher education in the West Indies and other colonial areas is of continuing interest to Carnegie Corporation. The income from \$12 million of the Corporation's endowment is used for educational purposes in the British Dominions and Colonies, and the grant to the University College of the West Indies was made as a part of this program.



PERSONS & PLACES

From the Workshop of D. S. Freeman

When the sixth volume of Douglas Southall Freeman's life of George Washington appeared last fall, a critic for the *Herald Tribune* Book Review wrote, "This body of writings won Freeman, while living, the reputation of being America's greatest modern biographer; his books, it can be safely predicted, will remain permanent classics in the field of American historical literature."

Through grants to Johns Hopkins University, Carnegie Corporation aided Mr. Freeman's historical studies from 1944 to his death in 1953. A recent grant helped cover expenses of preparing the final volume for posthumous publication.

Mr. Freeman's reports to the Corporation on the progress of his research were rich with the excitement of a man truly devoted to his work. They were small lessons in history and humanity as well. This note written in 1952, concerning a "mystery" in Martha Washington's letters, is a good example.

"I think you will be amused," wrote Mr. Freeman, "by one more discovery. Mrs. Martha Washington had little formal education, and in letter-writing she was almost as defective as Washington's mother. About 1787 there was a marked improvement in the style and in the spelling of Martha's letters. This remained something of a mystery until [one of my assistants] came upon two papers, side by side. One was a careful letter, ostensibly by Martha, in her husband's handwriting, the other was Martha's own copy from it—and none too good a copy at that. In other words, the General began to write Martha's letters and she copied and signed what he had set before her."

This warm interest in human detail, so much a part of Mr. Freeman's

makeup, enkindled all his writings and helped to make his books the living classics that they are.

Board Elections

Elections held by the Carnegie Corporation Board of Trustees at the annual meeting in November resulted in the re-election of R. C. Leffingwell as chairman of the Board for the coming year, and the re-election of Margaret Carnegie Miller and Elihu Root, Jr. to be members of the Board for five-year terms.

Frederick Osborn was re-elected a member of the Corporation's executive committee, the other members of which are Mr. Root, chairman, Morris Hadley, Nicholas Kelley and Mr. Leffingwell. The finance committee for the year will be composed of Arthur W. Page, chairman, Devereux C. Josephs, Mr. Kelley, Mr. Leffingwell and Mr. Root. The president of the Corporation is an ex-officio member of both committees.

Charles Dollard Resigns as Carnegie President

In his Annual Report for 1951, Charles Dollard wrote, "The annual task of rendering an account of the Corporation's work is both a joyful and a painful one: joyful because it recalls the excitement and satisfaction of working with good people to accomplish good things; painful because it also recalls . . . the old dictum that money is barren. Money is barren until and unless it is put in the hands of people with hearts and heads, with energy, confidence and good will."

As an administrator of Carnegie funds, Mr. Dollard demonstrated the same qualities he looked for in those who applied for grants. His resignation as president of Carnegie Corporation was announced in November, follow-

ing the annual meeting of the Board of Trustees. He tendered his resignation for reasons of health. The Board accepted his resignation with regret and invited him to continue a relationship to the Corporation as a consultant. John W. Gardner, a vice president and trustee of the Corporation, was appointed acting president.

Mr. Dollard first joined the Corporation staff in 1938 as assistant to the president. He had previously served as assistant dean of the University of Wisconsin, where he received his A.B. and A.M. degrees.

During World War II, Mr. Dollard attained the rank of lieutenant colonel, serving as deputy director of operations for the Information and Education Division of the General Staff Corps. After his separation from the service, he became successively executive associate and vice president of Carnegie Corporation, then president in 1948.

Florence Anderson Named Secretary of Corporation

At the annual meeting of the Corporation's Board of Trustees, Florence Anderson was appointed secretary of Carnegie Corporation. She succeeds Robert M. Lester, who retired after twenty-eight years of service.

One of the few women to achieve an executive post with a major foundation, Miss Anderson joined the Corporation staff in 1934. She was appointed an administrative assistant five years later, became assistant secretary in 1947 and associate secretary in 1951.

Miss Anderson is a graduate of Mount Holyoke College, where she was elected to Phi Beta Kappa. She served in the U.S. Marine Corps Women's Reserve during World War II as assistant adjutant of the Marine Corps School at Quantico, Virginia, terminating her service with the rank of captain.

Robert M. Lester Heads Fellowship Fund

Appointment of Robert M. Lester as executive director of the Southern Fellowships Fund of the Council of Southern Universities, Inc. has recently been announced. The Fund was created to administer a ten-year grant of more than three million dollars made by the General Education Board to advance scholarship and teaching in southern colleges and universities. Mr. Lester retired as secretary of Carnegie Corporation in November.

Mr. Lester joined the Corporation staff in 1926 as assistant to the president. He was appointed secretary in 1934, and is the author of many publications concerning Carnegie Corporation, including *Forty Years of Carnegie Giving* and *A Thirty-Year Catalogue of Grants*. Mr. Lester was also secretary of

the Carnegie Foundation for the Advancement of Teaching.

He received his A.B. degree from Vanderbilt University, his A.M. degree from Columbia University, and holds many honorary degrees from colleges and universities in this country and Canada.

★ New Grants ★

Grants amounting to \$1,274,000 were voted at the November meeting of the Carnegie Corporation Board of Trustees. These grants were made from income for the fiscal year 1954-55, now estimated at \$7,123,000.

From this total, \$2,159,000 has been set aside to meet commitments, including those for teachers' pensions, incurred in previous years. A balance of \$3,690,000 remains to be appropriated during the fiscal year which ends

September 30. It is the Corporation's policy to spend all its income in the year in which it is received.

A complete list of grants for each year is given in the Corporation's Annual Report. Grants voted recently include those listed below.

Council on Foreign Relations, for five-year support of research and study projects, regional committees, and a fellowship program for scholars and newspaper correspondents, \$500,000.

Educational Testing Service, for a pilot study of the size and composition of current and prospective college enrollments, \$50,000.

Michigan State College, for research on technological and social changes in under-developed areas, \$150,000.

Gold Coast College of Arts, Science and Technology and Nigerian College of Arts, Science and Technology, for library development, \$10,000 each.

THE CORPORATION TRUSTEES

One of Elihu Root, Jr.'s first and most colorful clients was the late Andrew Carnegie, a man who, Mr. Root recently recalled, "did not hold lawyers in awe." The senior Mr. Root, a close friend of Mr. Carnegie's, advised him on the establishment of Carnegie Corporation and served as chairman of its Board for 17 years. Mr. Root, Jr. has been a trustee of Carnegie Corporation since 1937.

Mr. Root received his A.B., A.M. and LL.D. degrees from Hamilton College, and his LL.B. degree from Harvard University.

He started practice in New York City with the firm of Byrne and Cutcheon. Later, with two young law school classmates, he formed a new firm, Root, Clark and Bird, which eventually grew to be one of the best-known in the country.

Mr. Root also has an extensive record of public service. His experience with what he describes as "the unfortunate business of making war" began



Elihu Root, Jr.

in 1916. He was instrumental in starting the Plattsburg Movement, which set up voluntary military training camps for civilians and provided this country with thousands of trained junior officers by the time war was declared. He saw active service as a battalion commander with the 304th Infantry in France.

During World War II, Mr. Root did numerous jobs for the government, their common tie being his inclination "to catch hold wherever there seemed to be a chance to give the war effort a push." His work on the U.S. Army Air Corps strategic target board, which advised on points where enemy economies should be attacked, won him the Medal for Merit.

Mr. Root and his old partner, Grenville Clark, are now of counsel to the firm of their former partners, Cleary, Gottlieb, Friendly and Hamilton. Mr. Root is chairman of Carnegie Corporation's executive committee and a member of its finance committee. He is a member of the executive committees of American Telephone and Telegraph Company, Mutual Life Insurance Company of New York and Fiduciary Trust Company of New York. He is a trustee of Hamilton College, the Carnegie Institution of Washington, the New York Public Library, and the Metropolitan Museum of Art.



During the depression years of the 1930's, the people of Puerto Rico drifted into a mood of frustration, hopelessness, and despair. Laments rather than programs for improvement were the order of the day. Even the president of the Insular Senate, at the height of his political career, declared in his official biography that he wished he had been born elsewhere.

Since that time, Puerto Rico has undergone what Chancellor Jaime Benitez of the University of Puerto Rico calls "a peaceful revolution." It has registered the greatest percentage increase in economic progress of any area in the world, according to statistics gathered by the Chase National Bank for the period 1942-52. Its net income jumped from under a quarter of a billion to a full billion; illiteracy was cut from 80 per cent to 15 per cent; the number of school rooms and teachers increased 75 per cent.

How has the University of Puerto Rico, our only land grant institution in a Latin American cultural area, participated in this "peaceful revolution"? In a recent talk, Chancellor Benitez traced the University's intimate connection with the island's advance to-

ward economic and political maturity.

"The University began 51 years ago as a normal school, training teachers for the public school system. This system actually started Puerto Rico on the road to social democracy. One of our most touching and beautiful sights has been and still is that of boys and girls, white and black, wealthy and destitute, highly born and illegitimate, learning side by side in the classroom."

By now the former normal school with its twelve teachers and 172 students has grown into one of the largest Spanish-speaking universities in the world. Its regular faculty numbers 727. Its student body is 13,158. In the past twelve years, the number of graduates has increased by 150 per cent.

Puerto Rico's rapidly changing society has created formidable demands for different professional skills. The University's response to this need is shown in the increased number of professional graduates. A spectacular jump has been registered in the number of degrees granted in medicine and allied fields, natural science, social science, business, accounting, and engineering. But Puerto Rico's needs still outdistance the supply. "We have no unem-

ployed graduates in Puerto Rico," says Mr. Benitez. "Nor will there be any for a long time to come. The demand for college-trained personnel in such an expanding economy is self-evident."

Carnegie Corporation grants have helped to advance certain phases of the University's program. Grants totaling \$130,000 have aided the School of Public Administration since 1947 in its task of providing an increased flow of well-trained personnel for various branches of government. A \$200,000 grant voted last year supports a new fellowship program to encourage independent scholarly work by providing faculty members with opportunity for research and advanced study. In the past, the Corporation has also made grants to the Polytechnic Institute of Puerto Rico, a private college offering an excellent undergraduate curriculum.

In spite of the profound changes the University of Puerto Rico has undergone in its lifetime, one thing has remained constant. As Chancellor Benitez puts it, "The University from its foundation has been the principal outlet open to young Puerto Ricans for developing their natural abilities and enabling them to put their talents to use. The future of a young man of modest family means formerly was to become a time-keeper or a clerk. Now all of this is changed. Through a vast system of scholarships, the opportunity for a university education and for professional training has been extended and made possible for able young people regardless of their economic background."

CARNEGIE CORPORATION OF NEW YORK

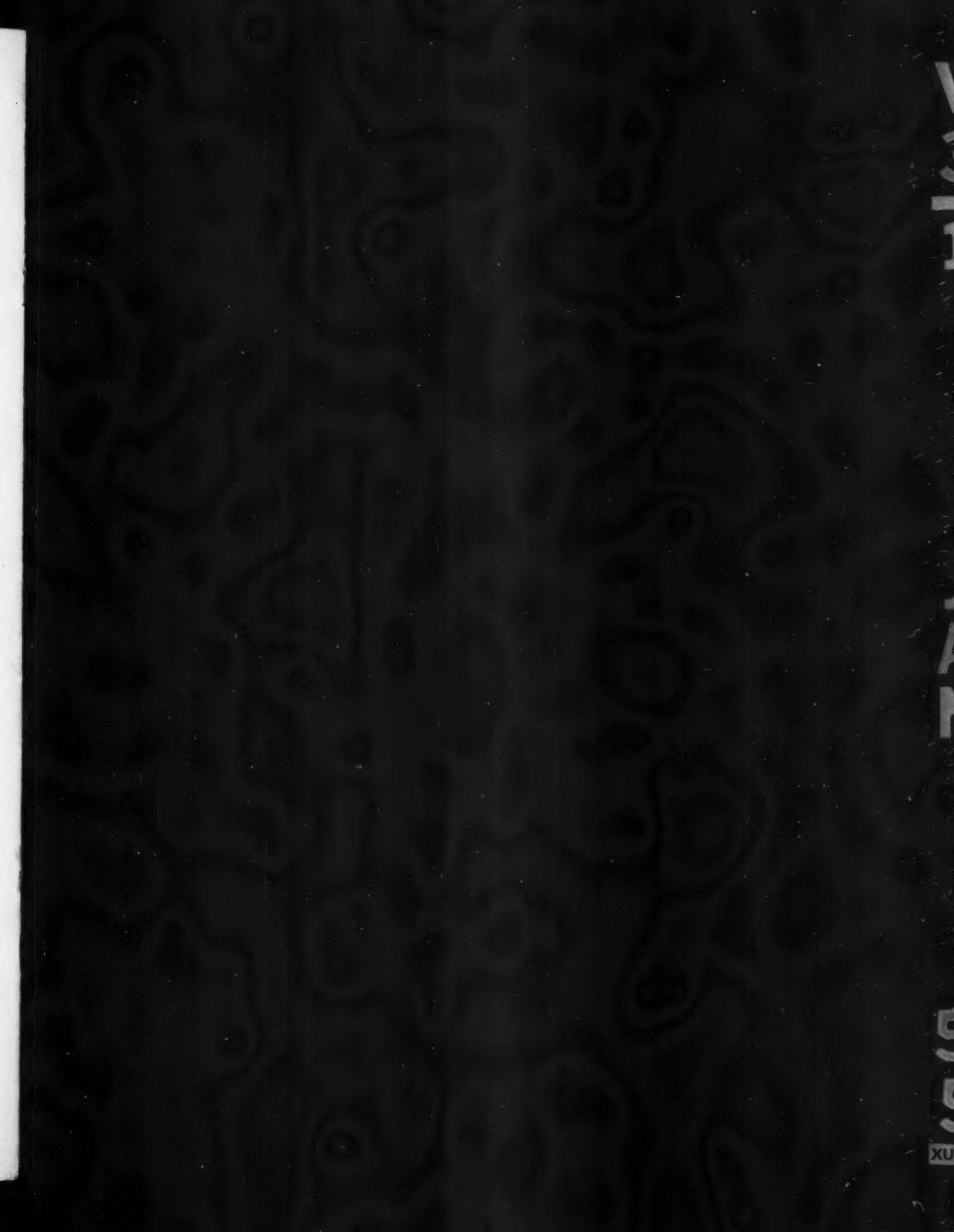
QUARTERLY REPORT

VOL. III • JANUARY, 1955 • NO. 1

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